IN THE CLAIMS

Please amend claims 1-13 as follows:

1. (Currently Amended) A parametric encoder ~~(100, 100')~~ for encoding an audio or speech ~~signal s~~ signal into sinusoidal code data, comprising:

- a segmentation unit ~~(110, 110')~~ for segmenting said ~~signal s~~ signal into at least one segment ~~x(n)~~;

- a calculation unit ~~(120, 120')~~ for calculating said sinusoidal code data in the form of the phase and amplitude data of an ~~given~~ extension ~~$\hat{x}(n)$~~ from the segment ~~x(n)~~ such that the extension ~~$\hat{x}(n)$~~ approximates the segment ~~x(n) as good as possible for a given criterion~~;

~~characterised in that~~ wherein

the calculation unit ~~(120, 120')~~ is adapted to calculate the sinusoidal code data $\theta_k^i, d_j^i$ and $e_j^i$ for the ~~following extension $\hat{x}$~~ extension represented by:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[ d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K-1} \theta_k^i n^k$$

wherein:

i, j, k, L, J, K : represent parameters;

n : represents a discrete time parameter;

Ci : represents the i'th component of the ~~extension $\hat{x}$~~ extension;

$\theta_k^i$ : represents the phase coefficient as one of said sinusoidal data;

$f_j$ : represents the jth instance out of the set of J linearly independent functions;

$\Theta^i$ : is a phase; and

$d_j^i, e_j^i$ : represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

2. (Currently Amended) The parametric encoder according to claim 1, ~~characterised in that~~ wherein $f_j(n) = n^j$.

3. (Currently Amended) The parametric encoder according to claim 1, ~~characterised in that~~ wherein the calculation unit ~~(120)~~ comprises:

- a frequency estimation unit ~~(122)~~ for determining a plurality of LxK phase coefficients $\theta_k^i$ with i=1-L and k=1-K for all components Ci of the extension ~~$\hat{x}$ (n)~~ representing the ~~received~~ segment ~~x(n)~~;

- a pattern generating unit ~~(124)~~ for calculating a plurality of L phases $\Theta^i(n)$ with i=1-L from the phase coefficients $\theta_k^i$ according to:

$$\Theta^i(n) = \sum_{k=1}^{K-1} \theta_k^i n^k$$

and for generating a plurality of JxL pairs of patterns $p_{ij}^1, p_{ij}^2$ for the components Ci with i=1-L according to:

$$p_{ij}^1 = f_j(n) \cos(\Theta^i(n)) \text{ and } p_{ij}^2 = f_j(n) \sin(\Theta^i(n))$$

- for i = 1-L and j = 0-(J-1); and

- an amplitude estimation unit ~~(126)~~ for determining a plurality of JxL amplitudes $d_j^i$ for the patterns $p_{ij}^1$ and a plurality of JxL amplitudes $e_j^i$ for the patterns $p_{ij}^2$ of all components Ci of the ~~extension $\hat{x}$~~ <u>extension</u>;

- wherein the sinusoidal data $\theta_k^i$, $d_j^i$ and $e_j^i$ is at least approximately ~~optimised~~ <u>optimized</u> for ~~the~~ <u>a</u> criterion that the weighted squared error E between the ~~segment x~~ <u>segment</u> and its ~~extension $\hat{x}$ is minimised~~ <u>extension is minimized</u>.

4.(Currently Amended) The parametric encoder according to claim 1, ~~characterised by~~ <u>further comprising</u> a multiplexer ~~(130)~~ for merging said sinusoidal code data into a data stream.

5.(Currently Amended) The parametric encoder according to claim 1, ~~characterised in that~~ <u>wherein</u> the calculation unit ~~(120')~~ comprises:

- a frequency estimation unit ~~(122')~~ for determining a plurality of K phase coefficients $\theta_k^i$ with k=1-K for the component Ci from an input value $\varepsilon_{i-1}$; wherein for the first component C1 with i=1 the input value is set to $\varepsilon_0$ = x(n), where the segment is x(n);

- a pattern generating unit ~~(124')~~ for calculating the phases $\Theta^i$ for the component Ci from said plurality of phase coefficients $\theta_k^i$ according to:

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

and for generating a plurality of 2xJ patterns $p_{ij}^1, p_{ij}^2$ with j=1-J for the component Ci with:

$p_{ij}^1$ = j(n) cos($\Theta^i$(n)) and $p_{ij}^2$ = fj(n)cos($\Theta^i$(n));

- an amplitude estimation unit ~~(126')~~ for determining a plurality of J amplitudes $d_j^1$ and of J amplitudes $e_j^i$ for said patterns of the component Ci from the ~~received~~ segment ~~x(n)~~ and from the ~~received~~ plurality of 2xJ patterns $p_{ij}^1$, $p_{ij}^2$;

- a ~~synthesiser (128')~~ synthesizer for re-constructing the component Ci from said plurality of 2xJ patterns $p_{ij}^1$, $p_{ij}^2$ and form the plurality of amplitudes $d_j^i$ and $e_j^i$ according to:

$$Ci = \sum_{j=0}^{J-1}\left[d_j^i f_j(n)\cos(\Theta^i(n)) + e_j^i f_j(n)\sin(\Theta^i(n))\right]$$

and

- a ~~substraction~~ subtraction unit ~~(129')~~ for ~~substracting~~ subtracting said component Ci form the input value $\varepsilon_{i-1}$ in order to feed the resulting difference $\varepsilon_i$ as new input value forward to the input of the frequency estimation unit ~~(122')~~ for calculating the sinusoidal code data representing the component Ci+1;

wherein the sinusoidal data $\theta_k^i$, $d_j^i$ and $e_j^i$ is ~~optimised~~ optimized for ~~the~~ a criterion that the weighted squared error E between the ~~segment x~~ segment and the ~~extension $\hat{x}$~~ extension is ~~minimised~~ minimized.

6. (Currently Amended) A parametric coding method for encoding an audio or speech ~~signal s~~ signal into sinusoidal code data, comprising the ~~steps~~ acts of:

- segmenting the ~~signal s~~ signal into at least one segment ~~x(n)~~; and

- calculating said sinusoidal code data in the form of phase and amplitude data of an ~~given extension~~ $\cancel{\hat{x}}$ extension from the segment ~~x(n)~~ such that the ~~extension~~ $\cancel{\hat{x}}$ extension approximates the segment x(n) ~~as good as possible for a given criterion~~,

~~characterised in that~~ wherein

- the ~~extension~~ $\cancel{\hat{x}}$ extension is defined ~~to~~ as:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[ d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i : represents a component Ci of the ~~extension~~ $\cancel{\hat{x}}$ ~~n)~~ extension;

| | | |
|---|---|---|
| j, k, L, J, K | : | represent parameters; |
| n | : | represents a discrete time parameter; |
| $f_j$ | : | represents the jth instance out of the set of J linearly independent functions; |
| $\theta_k^i$ | : | represents the phase coefficient as one of said sinusoidal data |
| $\Theta^i$ | : | is a phase; and |
| $d_j^i$, $e_j^i$ | : | represent the linearly involved amplitude values of the components representing parts of said sinusoidal data. |

7. (Currently Amended) The method according to claim 6, ~~characterised in that~~ wherein $f_j(n) = n^j$.

8. (Currently Amended) The method according to claim 6, ~~characterised in that~~ wherein the ~~frequencies~~ phase coefficients $\theta_l^i$ are defined by picking peak frequencies in the frequency domain of the ~~extension $\hat{x}$~~ extension.

9. (Currently Amended) The method according to claim 6, ~~characterised in that~~ wherein, for fulfilling ~~the~~ a criterion that the weighted squared error between the ~~segment x~~ segment and the ~~extension $\hat{x}$~~ extension is minimized, the definition of the optimal amplitudes $d_j^i$ and $e_j^i$ comprises the ~~steps~~ acts of:

- determining a plurality of LxK phase coefficients $\theta_k^i$ with i=1-L and k=1-K for all components Ci of the ~~received segment x(n)~~ segment;

- calculating a plurality of L phases $\Theta^i(n)$ with i=1-L from the phase coefficients $\theta_k^i$ according to:

$$\Theta^i(n)=\sum_{k=1}^{K}\theta_k^i n^k \ ;$$

- generating a plurality of JxL pairs of patterns $p_{ij}^1$, $p_{ij}^2$ for the components Ci with i=1-L according to:

$p_{ij}^1$ = $f_j(n)\cos(\Theta^i(n))$ and $p_{ij}^2$ = $f_j(n)\sin(\Theta^i(n))$; and

- determining a plurality of JxL amplitudes $d_j^i$ and a plurality of JxL amplitudes $e_j^i$ for all the pairs of patterns $p_{ij}^1$, $p_{ij}^2$ of all components Ci of the extension $\hat{x}$.

10. (Currently Amended) The method according to claim 6, ~~characterised in that~~ wherein, for fulfilling ~~the~~ a criterion that the weighted squared error between the ~~segment x~~ segment and the ~~extension $\hat{x}$~~ extension is minimized, ~~the~~ a definition of the amplitudes $d_j^i$ and $e_j^i$ comprises the ~~steps~~ acts of:

a) setting i= 1

b) $\varepsilon_{i-1} = \varepsilon_0 = x(n)$;

c) determining a plurality of K phase coefficients $\theta_k^i$ with k=1-K for the component Ci from an input value $\varepsilon_{i-1}$;

d) calculating the phases $\Theta^i$ for the component Ci from said plurality of phase coefficients $\theta_k^i$ according to:

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

e) generating a plurality of 2xJ patterns $p_{ij}^1$, $p_{ij}^2$ with

j=0-(J-1) for the component Ci with:

$p_{ij}^1$ = $f_j(n)$ cos( $\Theta^i(n)$) and $p_{ij}^2$ = $f_j(n)\sin(\Theta^i(n))$;

f) determining a plurality of J amplitudes $d_j^i$ and of J amplitudes $e_j^i$ for said patterns for the component Ci from the ~~received segment x(n)~~ segment and from the ~~received~~ plurality of 2xJ patterns $p_{ij}^1$, $p_{ij}^2$;

g) constructing the component Ci from said plurality of J pairs of patterns pij and from the plurality of amplitudes $d_j^i$ and $e_j^i$ according to:

$$Ci = \sum_{j=0}^{J-1}\left[d_j^i f_j(n)\cos(\Theta^i(n)) + e_j^i f_j(n)\sin(\Theta^i(n))\right]$$

h) ~~substracting~~ subtracting said component Ci from the input value $\varepsilon_{i-1}$ in order to calculate a resulting difference $\varepsilon_i$;

i) checking if i $\geq$ L wherein L represents a given ~~number of~~ number of components ;

j) if i < L repeat the method ~~steps~~ acts by starting again from ~~step~~ act c) with i = i+1; and

k) if i $\geq$ L the sinusoidal code data of all L components of the ~~extension $\hat{x}$~~ extension have been calculated ~~and thus the process has finished~~.

11. (Currently Amended) A parametric decoder ~~(400)~~ for re-constructing an ~~approximation $\hat{s}$~~ approximation of an audio or speech ~~signal s from transmitted~~ signal from transmitted or restored code data, comprising:

- a selecting unit ~~(420)~~ for selecting sinusoidal code data representing ~~segments $\hat{x}$~~ segments of the ~~approximation $\hat{s}$~~ approximation from said ~~received~~ transmitted or restored code data;

- a ~~synthesiser (440)~~ synthesizer for re-constructing said ~~segments $\hat{x}$~~ segments from said ~~received~~ sinusoidal code data; and

- a joining unit ~~(460)~~ for joining consecutive ~~segments $\hat{x}$~~ segments to form said ~~approximation $\hat{s}$~~ approximation of the audio or speech ~~signal s~~ signal;

wherein the sinusoidal code data is a plurality of frequency and amplitude values for at least one component of said ~~segment $\hat{x}$~~ segments;

~~characterised in that~~ wherein

- the ~~synthesiser~~ synthesizer is adapted to re-construct said ~~segments $\hat{x}$~~ segments from said sinusoidal code data according to an extension represented by the following formula:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[ d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i : represents a component Ci of the ~~extension $\hat{x}(n)$~~ extension;

j,k, L, J, K : represent parameters;

n : represents a discrete time parameter;

$f_j$ : represents the jth instance out of the set of J linearly independent functions;

$\theta_k^i$ : represents the phase coefficient value as one of said sinusoidal data

$\Theta^i$ : is a phase; and

$d_j^i$, $e_j^i$ : represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

12. (Currently Amended) Decoding method for reconstructing an ~~approximation $\hat{s}$~~ approximation of an audio or speech ~~signal s~~ signal from transmitted or restored code data, comprising the ~~steps~~ acts of selecting sinusoidal code data representing ~~segments $\hat{x}$~~ segments of the ~~approximation $\hat{s}$~~ approximation from said ~~received~~ transmitted or restored code data;

- re-constructing said ~~segments $\hat{x}$~~ segments from said ~~received~~ sinusoidal code data; and

- joining consecutive ~~segments $\hat{x}$~~ ones of said segments together in order to form said ~~approximation $\hat{s}$~~ of the audio or speech ~~signal s~~ signal;

- wherein the sinusoidal code data is a plurality of phase and amplitude values for at least one component of said ~~segment $\hat{x}$~~ segment,

~~characterised in that~~ wherein

- in said re-construction ~~step~~ act, the ~~segments $\hat{x}$~~ segments are re-constructed from said sinusoidal code data according to an extension represented by the following formula:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L}\sum_{j=0}^{J-1}\left[d_j^i f_j(n)\cos(\Theta^i(n)) + e_j^i f_j(n)\sin(\Theta^i(n))\right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i : represents a component Ci of the ~~extension $\hat{x}(n)$~~ extension;

j,k, L, J, K : represent parameters;

n : represents a discrete time parameter;

$f_j$ : represents the jth instance out of the set of J linearly independent functions;

$\theta_k^i$ : represents the phase coefficient as one of said sinusoidal data

$\Theta^i$ : is a phase; and

$d_j^i$ , $e_j^i$ : represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

13. (Currently Amended) Data stream comprising sinusoidal code data representing ~~segments $\hat{x}$~~ a segment of an ~~approximation $\hat{s}$~~ approximation of an audio or speech signal, wherein the sinusoidal code data is a plurality of phase and amplitude values for at least one component of said ~~segment $\hat{x}$~~ segment, ~~characterised in that~~ wherein the ~~segment $\hat{x}$~~ segment is defined according to an extension represented by to:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[ d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i : represents a component Ci of the ~~extension $\hat{x}(n)$~~ extension;

j,k, L, J, K : represent parameters;

n : represents a discrete time parameter;

$f_j$ : represents the jth instance out of the set of J linearly independent functions;

$\theta_k^i$ : represents the phase coefficient as one of said sinusoidal data

$\Theta^i$ : is a phase; and

$d_j^i$, $e_j^i$ : represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

14.(Original) Storage medium on which a data stream as claimed in claim 13 has been stored.